University of New England - Maine
Access Provided by:
SILVERCHAIR INFORMATION SYSTEMS

Chapter 29: Peptic Ulcer Disease

INTRODUCTION

- *Peptic ulcer disease* (PUD) involves ulcerative disorders of the upper gastrointestinal (GI) tract that require gastric acid and pepsin for formation. The three common causes include (1) *Helicobacter pylori* infection, (2) nonsteroidal anti-inflammatory drug (NSAID) use, and (3) stress-related mucosal damage.

CLINICAL PRESENTATION

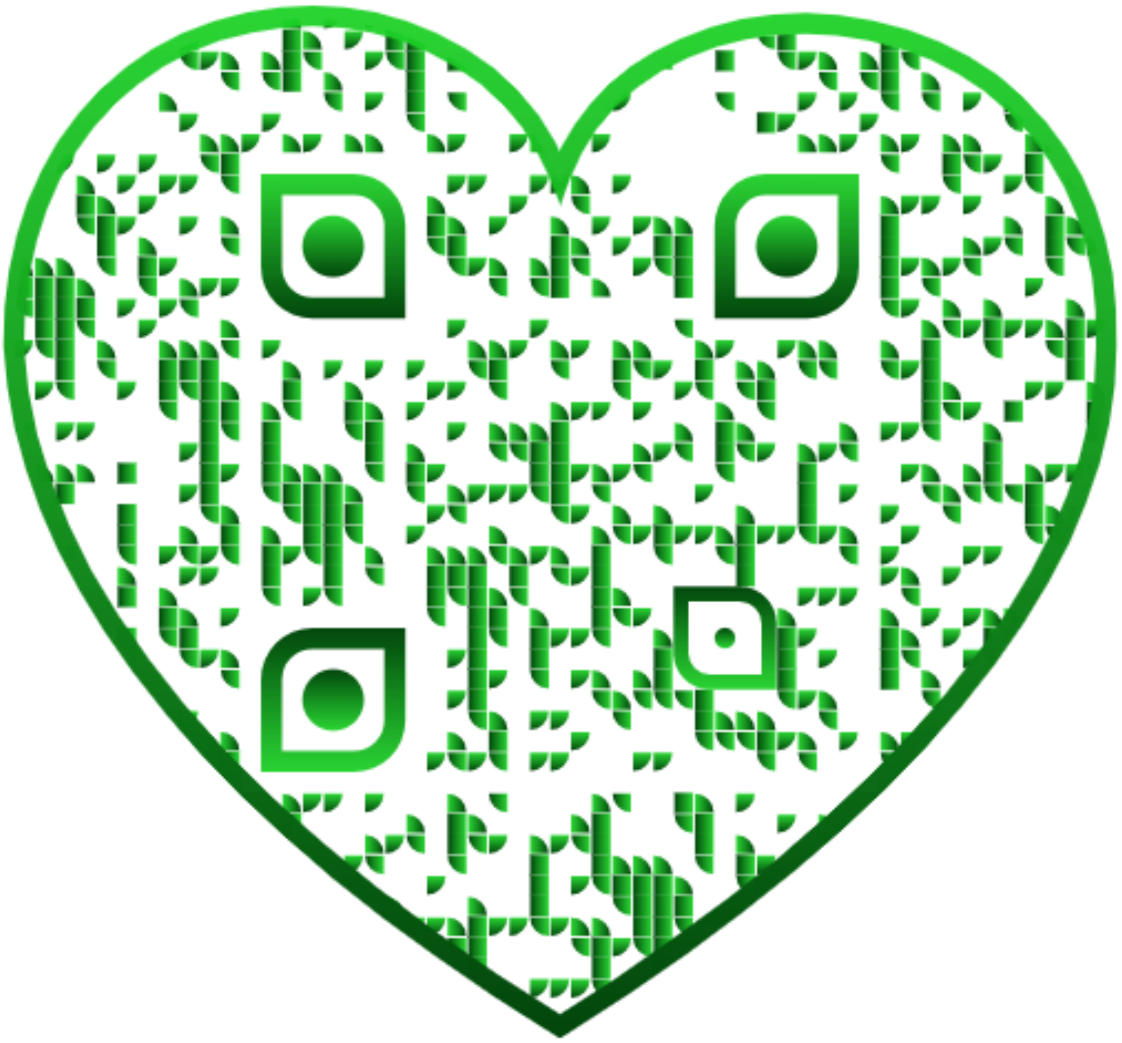
- Abdominal pain is the most common PUD symptom. It is often epigastric and described as burning, but can also present as vague discomfort, abdominal fullness, or cramping. Nocturnal pain may wake patients, especially between 12 AM and 3 AM.
- Pain from duodenal ulcers typically occurs 1–3 hours after meals and is relieved by food, while gastric ulcer pain may worsen with eating. Antacids usually provide rapid relief.
- Heartburn, belching, and bloating often accompany pain. Nausea, vomiting, and anorexia are more frequent in gastric than duodenal ulcers and may indicate an ulcer-related complication.
- Symptom severity varies and may be seasonal, occurring more frequently in spring or fall. Discomfort often occurs in clusters, lasting up to a few weeks and followed by pain-free periods lasting from weeks to years.
- Presence or absence of epigastric pain does not define an ulcer, and ulcer healing does not guarantee symptom resolution. Conversely, lack of pain does not rule out an ulcer diagnosis, particularly in older persons, who may exhibit a "silent" ulcer complication.
- Ulcer complications include upper GI bleeding, perforation into the peritoneal cavity, penetration into an adjacent structure (eg, pancreas, biliary tract, or liver), and gastric outlet obstruction. Bleeding may be occult or present as melena or hematemesis. Perforation causes sudden, sharp, severe pain, beginning first in the epigastrium but spreading quickly over the entire abdomen. Symptoms of gastric outlet obstruction typically occur over several months and include early satiety, bloating, anorexia, nausea, vomiting, and weight loss.

DIAGNOSIS

- Physical examination may reveal epigastric tenderness between the umbilicus and the xiphoid process, sometimes radiating to the back.
- Routine blood tests are not useful for diagnosing PUD. Hematocrit, hemoglobin, and stool guaiac tests help detect bleeding.
- Diagnosis depends on visualizing the ulcer crater. Upper GI endoscopy has replaced radiography as the preferred method, offering more accurate diagnosis, direct ulcer visualization, bleeding control, and *H. pylori* testing.
- Diagnosis of *H. pylori* infection can be made using endoscopic or nonendoscopic (urea breath test [UBT], serologic antibody detection, and fecal antigen) tests. Testing for *H. pylori* is only recommended if eradication therapy is planned. If endoscopy is not planned, serologic antibody testing is reasonable. Endoscopic biopsy-based tests, UBT, and fecal antigen tests are the recommended tests to verify *H. pylori* eradication but must be delayed until at least 4 weeks after completion of antibiotic treatment and 2 weeks after proton pump inhibitor (PPI) discontinuation to avoid mistaking bacterial suppression for eradication.

TREATMENT

Downloaded 2026-3-8 5:18 PM Your IP is 176.123.19.29
Chapter 29: Peptic Ulcer Disease,
©2026 McGraw Hill. All Rights Reserved. Terms of Use • Privacy Policy • Notice • Accessibility



- Goals of Treatment: Overall goals are to relieve pain, heal the ulcer, prevent recurrence, and reduce complications. In *H. pylori*–positive patients with an active or past ulcer or prior ulcer-related complication, the goals are to eradicate *H. pylori*, heal the ulcer, and cure the disease with a cost-effective regimen. For NSAID-induced ulcers, the primary goal is to heal the ulcer as quickly as possible.

NONPHARMACOLOGIC TREATMENT

- Lifestyle changes, including stress reduction and smoking cessation, should be implemented. NSAIDs should be avoided if possible; alternatives like acetaminophen or a nonacetylated salicylate (eg, salsalate) should be used for pain relief when feasible.
- No specific diet is recommended, but patients should avoid foods and drinks that worsen dyspepsia or ulcer symptoms (eg, spicy foods, caffeine, alcohol).
- Emergent surgery may be necessary for ulcer-related complications (eg, bleeding, perforation, obstruction).

PHARMACOLOGIC TREATMENT

- **Figure 29-1** shows an algorithm for evaluating and managing a patient with dyspeptic or ulcer-like symptoms.
- Established indications for *H. pylori* treatment include active PUD, history of PUD (unless eradication was confirmed, mucosa-associated lymphoid tissue lymphoma, and after endoscopic resection of gastric cancer.
- Ideally, *H. pylori* treatment should be highly effective, well tolerated, easy to adhere to, and cost-effective. Current regimens often fall short in one or more of these areas, making the ideal treatment difficult to define.
- **Table 29-1** outlines recommended first-line regimens to eradicate *H. pylori* infection in treatment-naïve patients.

  ✓ *"Optimized" bismuth quadruple therapy (BQT)*—**bismuth salicylate**, **metronidazole, tetracycline,** and a **PPI**—is recommended as initial or salvage therapy and is preferred for patients with a documented penicillin allergy. Nonoptimized BQT refers to therapy lasting <10 days, metronidazole dose less than 1.5–2 g/day, substitution of doxycycline for tetracycline, or inadequate PPI dosing. Eradication rates are similar across bismuth preparations. PPIs should be taken 30–60 minutes before meals; all other medications should be taken with meals and at bedtime. Limitations of BQT include four times daily dosing, adherence issues, and frequent minor adverse effects.

  ✓ *Dual therapy* consists of **amoxicillin** plus high doses of a PPI or potassium-competitive acid blocker (PCAB). **Vonoprazan** was the only PCAB available commercially in the United States in late 2025. *Triple therapy* includes amoxicillin and **clarithromycin** plus an acid-suppressant. These regimens are gaining use due to rising resistance to **clarithromycin, metronidazole,** and **levofloxacin.** Amoxicillin has a low rate of primary resistance but is inactivated by low stomach pH; thus, high doses of PPIs or PCABs are needed to achieve pH >6, which enhances amoxicillin's activity against *H. pylori*. PCAB regimens have shown better eradication rates than PPI-based ones in several trials. In the United States, PCAB dual and triple therapies are available as Voquezna Dual Pak and Triple Pak; the acid suppressant must be taken separately. See **Table 29-1** for components, dosages, and instructions.

  ✓ *Rifabutin triple therapy* (**rifabutin, amoxicillin,** and a PPI) is available as Talicia, a proprietary preparation containing coformulated capsules with rifabutin 12.5 mg, amoxicillin 250 mg, and **omeprazole** 10 mg. It is FDA-approved for treatment-naïve and treatment-experienced adults. The dosing is four capsules three times daily, providing total daily doses of omeprazole 120 mg, rifabutin 150 mg, and amoxicillin 3000 mg. Resistance rates for amoxicillin (2.6%) and rifabutin (0.2%) are very low. Limitations include high capsule burden, frequent dosing, and possible rifabutin drug interactions.

- Due to rising resistance, levofloxacin triple therapy is recommended only for treatment-experienced patients with confirmed levofloxacin susceptibility. Levofloxacin sequential therapy and the quadruple "LOAD" regimen are not recommended because of cost and limited data. Concerns with fluoroquinolones include resistance development and side effects (eg, tendonitis, hepatotoxicity).
- Avoid clarithromycin in any regimen unless sensitivity is documented; however, *H. pylori* susceptibility testing is not widely available.
- If initial treatment fails to eradicate *H. pylori*, second-line (salvage) treatment should (1) use antibiotics not in the initial regimen, (2) be guided by regional or individual antibiotic susceptibility testing, and (3) last 10–14 days. Preferred regimens are in **Tables 29-1** and **29-2**. Optimized BQT is

Downloaded 2026-3-8 5:18 PM Your IP is 176.123.19.29
Chapter 29: Peptic Ulcer Disease,
©2026 McGraw Hill. All Rights Reserved. Terms of Use • Privacy Policy • Notice • Accessibility

preferred if not previously given. Other options include rifabutin triple, levofloxacin triple, PCAB triple, and high-dose dual therapy. Referral to an allergist for penicillin allergy confirmation and possible desensitization is recommended when optimized BQT is not suitable.

- In patients with confirmed NSAID-associated ulcers, stop NSAID therapy and test for *H. pylori*. Most uncomplicated NSAID ulcers heal with a standard 8-week regimen of a histamine-2 receptor antagonist (H2RA), PPI, or sucralfate. PPIs are preferred due to faster symptom relief and healing. If *H. pylori*–positive, start a recommended first-line regimen (**Table 29-1**). If NSAIDs must continue, add PPI cotherapy and extend treatment to 12 weeks. Also, consider lowering the NSAID dose or switching to acetaminophen or a nonacetylated salicylate. Switch patients at highest risk of recurrent ulcers or ulcer-related complications to a cyclooxygenase 2 (COX-2) inhibitor. If the ulcer is *H. pylori*–positive, begin eradication therapy with a regimen that contains a PPI.
- Limit maintenance therapy with a PPI or H2RA to high-risk patients with ulcer complications, those who fail *H. pylori* eradication, and patients with *H. pylori*–negative ulcers.
- Patients with treatment-refractory ulcers should have upper endoscopy to confirm nonhealing, exclude malignancy and assess *H. pylori* status. *H. pylori*–positive patients should receive eradication therapy. If ulcers persist despite standard PPI therapy, retreat with double-dose PPI or consider a different PPI.
- To prevent NSAID-related ulcers, use cotherapy of an NSAID with a PPI, H2RA, or misoprostol; preferential use of a COX-2 selective NSAID; or combination of a gastroprotective agent with a COX-2 selective NSAID. A COX-2 selective NSAID plus a PPI offers the best protection against upper GI complications. PCABs are not FDA-approved for this use in the United States.

FIGURE 29-1

Guidelines for the evaluation and management of a patient who presents with dyspeptic or ulcer-like symptoms.

Downloaded 2026-3-8 5:18 PM Your IP is 176.123.19.29
Chapter 29: Peptic Ulcer Disease,
©2026 McGraw Hill. All Rights Reserved. Terms of Use • Privacy Policy • Notice • Accessibility

University of New England - Maine
Access Provided by:
SILVERCHAIR INFORMATION/SYSTEMS

TABLE 29-1

Drug Regimens Used to Eradicate *H. pylori*

Regimen	Duration	Acid Suppressive Therapy	Antibiotic #1	Antibiotic #2	Antibiotic #3
Recommended Regimens for Treatment-Naïve Patients with *H. pylori* Infection					
Optimized bismuth quadruple	10–14 days	PPI (standard dose) twice daily	Bismuth subcitrate (120–300 mg) or subsalicylate (300 mg) four times daily	Metronidazole 500 mg three or four times daily	Tetracycline 500 mg four times daily
Rifabutin triple	14 days	Omeprazole 40 mg every 8 hours	Amoxicillin 1 g every 8 hours	Rifabutin 50 mg every 8 hours	
PCAB dual	14 days	Vonoprazan 20 mg twice daily	Amoxicillin 1 g every 8 hours		
PCAB triple	14 days	Vonoprazan 20 mg twice daily	Amoxicillin 1 g twice daily	Clarithromycin 500 mg twice daily	
Recommended Salvage Regimens for Treatment-Experienced Patients with Persistent *H. pylori* Infection					
Optimized bismuth quadruple	10–14 days	PPI (standard dose) twice daily	Bismuth subcitrate (120–300 mg) or subsalicylate (300 mg) four times daily	Metronidazole 500 mg three or four times daily	Tetracycline 500 mg four times daily
Rifabutin triple	14 days	PPI (standard or double dose) twice daily	Amoxicillin 1 g twice or three times daily	Rifabutin 150–300 mg/day divided twice or three times daily	
Levofloxacin triple	10–14 days	PPI (standard dose) twice daily	Levofloxacin 500 mg daily	Amoxicillin 1 g or metronidazole 500 mg twice daily	
PCAB triple	14 days	Vonoprazan 20 mg twice daily	Amoxicillin 1 g twice daily	Clarithromycin 500 mg twice daily	
High-dose dual therapy	14 days	Vonoprazan 20 mg or PPI (double dose) twice or three times daily	Amoxicillin 1 g every 8 hours		

Downloaded 2026-3-8 5:18 PM Your IP is 176.123.19.29
Chapter 29: Peptic Ulcer Disease,
©2026 McGraw Hill. All Rights Reserved. Terms of Use • Privacy Policy • Notice • Accessibility

University of New England - Maine
Access Provided by:
SILVERCHAIR INFORMATION/SYSTEMS

TABLE 29-2

Drug Dosing Table

Drug	Brand Name	Initial Dose	Usual Range
Proton Pump Inhibitors			
Omeprazole	Prilosec, various	40 mg daily	20–40 mg/day
Omeprazole + sodium bicarbonate	Zegerid	40 mg daily	20–40 mg/day
Lansoprazole	Prevacid, various	30 mg daily	15–30 mg/day
Rabeprazole	Aciphex	20 mg daily	20–40 mg/day
Pantoprazole	Protonix, various	40 mg daily	40–80 mg/day
Esomeprazole	Nexium	40 mg daily	20–40 mg/day
Dexlansoprazole	Dexilant	30–60 mg daily	30–60 mg/day
Potassium-Competitive Acid Blockers (PCABs)			
Vonoprazan	Coquina	20 mg twice daily	20 mg twice daily
H_2 Receptor Antagonists			
Cimetidine	Tagamet, various	300 mg four times daily, 400 mg twice daily, or 800 mg at bedtime	800–1600 mg/day in divided doses
Famotidine	Pepcid, various	20 mg twice daily, or 40 mg at bedtime	20–40 mg/day
Nizatidine	Axid, various	150 mg twice daily, or 300 mg at bedtime	150–300 mg/day
Ranitidine[a]	Zantac, various	150 mg twice daily, or 300 mg at bedtime	150–300 mg/day
Mucosal Protectants			
Sucralfate	Carafate, various	1 g four times daily, or 2 g twice daily	2–4 g/day
Misoprostol	Cytotec	100–200 mcg four times daily	400–800 mcg/day

[a]Ranitidine products are no longer available in the United States.

EVALUATION OF THERAPEUTIC OUTCOMES

Downloaded 2026-3-8 5:18 PM Your IP is 176.123.19.29
Chapter 29: Peptic Ulcer Disease,
©2026 McGraw Hill. All Rights Reserved. Terms of Use • Privacy Policy • Notice • Accessibility

- Monitor patients for relief of ulcer pain, adverse drug effects, and drug interactions.
- Ulcer pain usually resolves in a few days after stopping NSAIDs and within 7 days of starting antiulcer therapy. Patients with uncomplicated PUD are usually symptom-free after recommended treatments.
- Persistent or recurrent symptoms within 14 days after treatment suggest failure of ulcer healing or *H. pylori* eradication or another diagnosis such as gastroesophageal reflux disease.
- Confirm *H. pylori* eradication after treatment, especially in high-risk patients.
- Monitor NSAID users closely for bleeding, obstruction, penetration, and perforation.
- ndoscopy is warranted for frequent recurrence, refractory disease, complications, or suspected hypersecretory states.

See Chapter 54, Peptic Ulcer Disease and Related Disorders, authored by Bryan L. Love, for a more detailed discussion of this topic.

Downloaded 2026-3-8 5:18 PM Your IP is 176.123.19.29
Chapter 29: Peptic Ulcer Disease,
©2026 McGraw Hill. All Rights Reserved. Terms of Use • Privacy Policy • Notice • Accessibility